REMARKS/ARGUMENTS

Claims 1 and 5 have been amended to more clearly describe the invention. Claim 7 has been added. Support for the amendments to claims 1and 5 and for new claim 7 can be found in the specification and claims, for example, page 6, lines 23-31 through page 7, lines 1-12, and Example 1, (e.g., page 8, lines 24-25 and lines 27-31 and page 9, lines 1-17).

The Invention

Claim 1 has been amended as follows:

> A disposable feminine hygiene paper-based product formed from paper mulch selected from the group consisting of sanitary napkins, sanitary pads, panty shields and tampons for combating yeast infections, said feminine hygiene paper product comprising a plurality of dark-brown fibers wherein said fibers are coated with an anti-fungal, water-insoluble form of copper oxide directly bound to the fibers, which fibers have been added to said paper mulch and which fibers release Cu^{++} ions when in contact with a fluid.

The invention provides paper products comprising textile or cellulose fibers that release Cu^{++} ions when in contact with a fluid, having an anti-fungal effect. The coated fibers are prepared as described in Example 1 (in a manner know for preparation of fibers and yarns, as described in US Pat. No. 6,124,221, example 2, and WO 01/81671 as acknowledged on page 4, line 24 to page 5, line 8 of the instant application). Without intending to be bound by a particular mechanism, this process results in fibers coated with copper oxide in which the oxygen is contributed by cellulose. That is, it is postulated that cupric oxide [i.e., Cu^{2+}--O--cellulose] and cuprous oxide [$(Cu^{1+})_2$--O--cellulose] are formed in which the oxygen is from a cellulose hydroxyl group and/or part of the ether linkages in the monomer hexose rings of cellulose. Evidence that cupric oxide and cuprous oxide are present includes (a) the dark brown color of the fibers, characteristic of a mixture of Cu_2O and CuO (see page 6, lines 26-27)[1] (b) XPS

[1] Copper can be found in a number of different states and the these states can be characterized by a difference in color. For example, metallic copper is a reddish color, copper hydroxide is blue, cuprous

spectrographic analysis the peaks on the spectrographic chart show the characteristics of cooper oxides and (c) production of copper oxides is consistent with the preparation of the fibers using tin dichloride and palladium as described in Example 1.[2]

Rejections Under 35 USC 102(b)

Claims 1-3, 5 and 6 were rejected under 35 U.S.C.§102(b) as allegedly anticipated by Weinberg. Weinberg describe chemically modifying cellulose fibers by a first stage treatment with a water soluble salt of a transition metal (e.g., copper sulfate) and an alkali (e.g., sodium hydroxide), resulting in a fiber having copper cations attached to cellulose by ionic bonds (col. 3,

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oxide is reddish brown and cupric oxide is black. A mixture of cuprous and cupric oxide would be dark brown.

[2]In Example 1, fibers were exposed to (i) a tin dichloride solution, (ii) a palladium solution and then rinsed in plain water, (iii) a copper sulfate chelating solution and (iv) a reducing agent. Copper is initially held as a complex in the copper sulfate chelating solution used in step (iii). Steps (i) and (ii) activate the fibers with catalytic palladium nucleation sites. In the presence of the activated fibers and the reducing agent used in step (iv), the copper is forced out of the complex and interacts with the fibers. The postulated reactions may be as follows:

A. $Sn^{++} + Pd^{++} \rightarrow Sn^{+4} + Pd(s)$

B. $Cu^{2+} + 3HCHO + 5OH^- \rightarrow Cu(s) + 3HCOO^- + 2H_20 + 2H_2$

C. $Cu^{2+} + 3HCHO + 7OH^- \rightarrow Cu_2O(s) + 3HCOO^- + 3H_20 + 2H_2$

In addition, or alternatively, in alkaline solution oxidation of Cu(I) to Cu(II) is favored:

D. $2\,Cu_2O(s) + O_2 \rightarrow 4\,CuO$

When the oxygen is contributed by cellulose, copper oxide (mainly cupric oxide) may become attached to the fibers in the form of non-soluble salts:

E. cellulose-O + $Cu^{2+} \rightarrow$ Cu_2O-cellulose

F. cellulose-O + $Cu_2O \rightarrow$ CuO-cellulose

Dissolved oxygen gas is also present in solution in close proximity to the fibers being treated, and it is not excluded that some insoluble copper oxides are formed by reaction with free oxygen. Any resulting copper oxide is water insoluble and quite different from the water soluble copper compounds described in Weinberg (see col. 2, line 53).

lines 18-19). Weinberg reports that the color of the copper treated cellulose is light blue (see column 3, line 22). Light blue color is a characteristic of copper hydroxide, and not of the copper oxide of the instant invention. In the second stage the fiber is treated with a solution of a bisbiguanide compound (e.g., chlorhexidine). The chlorhexidine is bound to copper by coordinative bonds thereby forming a bond between the fibers, the transition metal and bisbiguanide. The process results in a cellulose-copper-bisbiguanide compound complex in which the bisbiguanide compound is attached to cellulose by ionic bonds and the copper is bound to the bisbiguanide compound (column 3, lines 45-54).

Thus, the present invention differs from the teachings of Weinberg at least because the association of copper and cellulose described by Weinberg differs from that of the present invention, as evidenced by the dark-brown color of the fibers of the present invention.

Applicants respectfully request withdrawal of the rejection.

Rejections Under 35 USC 103(a)

All of the claims 1-6 were rejected under 35 U.S.C.§ 103(a) as unpatentable over the combination of Weinberg and Gabbay (US 6,124,221). Applicants respectfully traverse these obviousness rejections.

The teachings of Weinberg are distinguished above in the discussion of the rejection under §102. The deficiencies of the Weinberg reference are not remedied by the teachings of Gabbay. Gabbay described production of coated textile fibers, such as cotton, silk, and synthetic cellulosic fibers such as rayon fabric (see column 2, lines 15-25). It would not have been obvious to use the methods of Gabbay in paper production. As noted in the instant application (e.g., 6, line 23 to page 7, line 1) paper chemistry and textile chemistry differ in important ways.

In paper-making processes, a fiber source starting material such as wood chips, plant material and/or recycled paper is first converted to pulp or mulch, a concentrated mixture of the fibers suspended in a liquid as a slurry. After treatment to remove lignin binders and other processing, the pulp or mulch is dried to form paper. Normal paper mulch is usually in an alkaline state with a pH which can vary from 8 to 11. While this atmosphere allows a reduction of copper to a cationic state to occur in an oxidation reduction process, the elements and the pH

of the mulch will inhibit a full chemical reaction. The reduction process will upset the malleability of the mulch and the inhibition of the full reaction will in turn cause a limit to the biocidal quality of the mulch.

However, the Applicants have surprisingly found that if the fibers are added after the mulch was made, the added fibers do not inhibit the paper forming process and, thus, a usable paper product can be obtained despite the incorporation of the fibers. As stated in the specification page 6, lines 23 to 31 through page 7, lines 1 to 12, "In order to have an effective level of biocidal and fungicidal activity and in order not to upset the proper production of paper, it was found ...that a fiber prepared with a plating of a cationic species of copper on it could be added to the mulch in the final stages of production..."

Moreover, fibers used in textile processing are usually long (e.g., such as fibers made from a synthetic cellulose) and would be expected to interfere with the paper forming step by changing the consistency of the mulch. Therefore, one skilled in the art of paper making would not have considered adding such fibers to paper mulch. However, as explained in the specification (page 9, line 6) it was also found to be advantageous to finely chop the fibers before adding them to the mulch, as recited in new claim 8.

Thus, the references relied on by the Office, considered individually or in combination, did not suggest paper products containing fibers coated with an anti-fungal, water-insoluble form of copper oxide directly bound to the fibers. Moreover, they did not suggest paper products made by adding textile or cellulose fibers coated with an anti-fungal, water-insoluble form of copper oxide directly bound to the fibers to a paper mulch. Still further, they did not suggest paper made by adding fibers (e.g. chopped textile fibers) coated with a water-insoluble form of copper oxide added to a paper mulch.

In view of the above amendments and comments, Applicants respectfully request withdrawal of the rejection under 35 U.S.C. §103(a).

Provisional type Double Patenting

Claims 1-6 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-6 of copending Application No.

10/371,491 in view of Weinberg (US 5,856,248). However, Application No. 10/371,491 has been abandoned, thus rendering the rejection moot.

Claims 1-6 were provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7 of copending Application No. 10/757,786 in view of Weinberg. Applicant will file a terminal disclaimer upon indication the claims are otherwise allowable.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested, if appropriate.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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